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A Guide to the Optimal Performance of Advanced Format 512e Drives from Toshiba

Properly configured Advanced Format (AF) 512e hard drives[1] may deliver superior performance as compared to legacy 512 byte-per-sector drive models. However, some computer operating systems (OSs) and application programs expect to operate with 512 byte sector disk drives. To provide compatibility in such cases AF 512e drives automatically convert 512-byte data blocks from the host and store them in a 4K block on the AF 512e drive. However, for optimal performance it is important to have proper partition boundary alignment between logical 512 byte data and the physical 4k sectors of the AF drive. Otherwise, the misalignment increases the time required to complete the 512 byte emulation writes to the disk which may result in a noticeable impact on system performance.

The Table below outlines which OSs are designed to establish proper 4K partition alignment for AF 512e drives and which can benefit from the assistance of an alignment utility for AF 512e drives.

To provide the best possible user experience, Toshiba offers the Paragon Alignment Tool for Toshiba AF 512e Drives as a free download at www.toshibastorage.com/alignment.

The Paragon Alignment Tool (PAT) for Toshiba AF 512e Drives has been specially optimized for Toshiba AF 512e hard drives. The PAT utility generally needs to be run once during the lifetime of the PC. However, should the OS or hard drive be changed, or if additional partitions are created on the hard drive, or if applications are used that bypass the OS when writing to the disk then it may be beneficial to rerun the PAT utility to help maximize system, application and drive performance.

Table – Operating Systems and Paragon Alignment Tool Usage Recommendations

Operating System	PAT Usage Guidelines for Toshiba AF 512e Drives
Microsoft® Windows 7 (32- or 64-bit) – factory installed	Not necessary*
Microsoft Windows 7 (32- or 64-bit) – non-factory installed	Recommended for all pre-Service Pack 1 (SP1) versions
Microsoft Windows Vista®, SP1 and above	Not necessary for 1 partition drive configurations* Recommended for >1 partition drive configurations
Microsoft Windows Vista, without SP	Recommended
Microsoft Windows XP (32- or 64-bit)	Recommended
Microsoft Windows Server® 2003	Recommended
Microsoft Windows Server R2 2003	Recommended
Microsoft Windows Home Server version 1	Recommended
Microsoft Windows Home Server	Recommended
Microsoft Windows Server 2008	Not necessary*
Microsoft Windows Server 2008 R2	Not necessary*
Microsoft Windows PE 3.0 and below	Recommended
Other Microsoft Windows OSs not listed above	Upgrading to an OS listed in this table is recommended if using AF drives
Apple Mac OS X 10.4 and above	Not necessary
Linux® Ubuntu 8.04 and below	Recommend using a Linux partition utility; (see FAQ)
Linux kernel 2.6.34 and below	Recommend using a Linux partition utility; (see FAQ)
Open SuSE Linux	Recommend using a Linux partition utility; (see FAQ)

NOTE: PAT may not be suitable for Toshiba AF 512e drive alignment activities involving multiple client systems or disk image cloning; (see PAT FAQ for more detail).

1. Generation One AF 512e drives are denoted in Toshiba literature as “4096/512e

* Periodic usage of the Paragon Alignment Tool (PAT for Toshiba AF 512e Drives) on systems where software and/or computer programs issue unaligned, un-buffered writes to the hard drive may improve the responsiveness of data written by these applications.

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